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(54) POSTAGE STAMP

(71) I, DAMON MOTT GUNN, of 4007 49th Street, North West Washington, D.C., United States of America, a citizen of the United States of America, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention is directed to postage stamps and sets out to economically bridge the gap between machine sorting of postal articles and the manual addressing of same. For background material which exposes the magnitude of the problem in the postal area, the reader is directed to the many publications of the United States Post Office Department and including "Human Factors Engineering in the Sorting and Handling of Mail", "Memorandum on Postal Needs" (H.F. Faught) and "Post Office Automatic Address Reader". There are, of course, a large number of prior art disclosures and apparatus presently available which have this same or similar objective, as for example, disclosed in the following United States patents; RE. 25,998 (Original 3,136,424) to Silverschotz; 3,350,545 to Street; 3,438,489 to Cambornac et. al; 3,090,870 to Rucket; 3,486,040 to McMillin; 3,180,996 De Good et. al; 3,122,237—Stenstrom; 2,988,984 Eckert, Jr. et. al. 3,246,751—Brenner et. al. and 2,815,400 Poylo; there being many others.

While a number of prior art systems provide for machine readable manually marked codes (as well as mechanically marked codes), it is evident from the recent, above noted, postal announcements that such systems have not solved the problem of bridging the gap between machine reading and manual marking of codes. While the present invention is directed principally towards method and apparatus for utilization and reading of manually marked codes, it will be apparent that several of the features to be described in greater detail, namely, the upside down

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passing of the articles through the reading station, and (2) the means for locating the manually markable grid, can be used to advantage in machine or mechanically marked codes.

According to the present invention, there is provided a postage stamp comprising a laminar body member having an adhesive coating on one surface thereof, a blank space or a grid pattern on the other surface of said laminar body member adapted to receive a manually or mechanically placed pattern of visible code markings, and locating means within said other surface adapted to produce guide signals for subsequent orientation of said manually placed pattern relative to a reading station, said locating means being detectable by means other than visual inspection.

The above and other features and advantages of the invention will become more apparent from the following specification taken in conjunction with the accompanying drawings wherein:—

Fig. 1 illustrates a postage stamp incorporating the invention;

Fig. 2 illustrates the postage stamp of Fig. 1 as manually marked and affixed to an article such as an envelope;

Fig. 2A illustrates a postage stamp manually marked with numerals in accordance with an aspect of the invention;

Figs. 3 and 4 illustrate respectively a mechanically marked zip or postal code and a postage meter device for doing same;

Fig. 5 is a partial isometric view illustrating apparatus for the sorting of postal articles according to the invention;

Figs. 6 (a) to Fig. 6 (e) illustrates various orientations of the grid guide elements as they pass through the reading stations sensing elements, and,

Fig. 7 (a) to Fig. 7 (e) illustrate the wave form of the output signals from the sensing elements of Fig. 6(a) to Fig. 6 (e), respectively.

Fig. 1 illustrates a postage stamp 10

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carrying a code grid 11 on its upper surface having the conventional adhesive (not shown) on the reverse surface for securing same to an envelope 12, Fig. 2 for example.

Code grid 11 comprises a plurality of vertical columns 13-1, 13-2 . . . 13-N which, in the embodiment shown, have ten blocks each for the numerals 0-9 and are in sequence. It will be appreciated that more or less blocks may be used, those enclosed for the digits 0-9 being for the purpose of using the zip code that is postal code system to facilitate mail delivery. Thus instead of numerals, letters of the alphabet may be used, and it will be apparent that instead of a row 14 of digits 0-9, each block may have its number printed therein. In the embodiment shown in Fig. 1, the code is manually marked by the user by entering dots, circles or X's or similar markings in the blocks as shown in Fig. 2. In Fig. 2 the zip code number "22180" has been manually marked by pencilling in the appropriate blocks with marks 18 in the manner shown.

Code grid 11 has integrally associated therewith a pair of code grid locating elements 20 and 21, constituted by a circle and an elongated triangle. These elements 20 and 21 provide reference means for locating the marks 18 in the code grid 11. Thus elements 20 and 21 may both be magnetic, fluorescent or electrically conductive ink but must be different from the material used for the code marks 18. Alternatively the elements 20 and 21 may have different properties, for example, element 20 may be fluorescent and element 21 may be magnetic, the main requirements being that the material of these elements be optically different and detectable by a device which ignores the materials in markings 18. It would be preferable to have these markings easily recognizable by electronic means so that an article with such marks as 20 and 21 submitted to such device would be easily oriented to a good reading position. Obviously, more or less different guide elements such as lines or designs of the code grid 11 may be used. As noted earlier, guide element 20 and 21 are for the purpose of locating the code marks in the template or code grid 11 which means the orientation thereof as well as the registration of same, because these guide elements are used to effect a relative adjustment between the code reading device and the code grid and the markings 18 so that an accurate reading of the manually marked code can be made. In keeping with a major objective of the invention it will be noted that the user of the code grid may be somewhat sloppy in marking the code. That is to say that as

long as the major position of a marking 18, is within desired code block, it will be registered for that block. (Apparatus for assuring this result by discrimination is known in the art as shown in the above McMillin patent.)

Guide elements 20 and 21 are located to the left of code grid 11 in Figs. 1 to 3 because in the preferred practice of this invention as applied to postal articles such as envelopes, the envelopes are turned upside down, with the top edge on a conveyor or guide rail and conveyed through a guide element detection station from left direction to right direction. In this way, the guide elements 20 and 21 are presented to the detection station slightly in advance of the code grid 11 although this is not mandatory as it is obvious that the guide elements may follow the grid through the reading station because the code reader is adjusted on deriving the position data from the guide elements. Thus, these guide elements 20 and 21 may have such additional marking so that if the envelope and stamp were read in reverse, that different code message would be reversed.

As shown in Fig. 2A the postage stamp 10' has grids in two banks, 11A' with printed copy book numerals, and 11' grid designed to receive such manually made marks as numerals 18', the numerals in 11' only being read by optical character readers now well known in the art and disclosed in the above Post Office Department Publications, as an example.

Referring to Fig. 5 of the drawings, postal articles, such as a stack of envelopes 12, have been previously oriented to have their stamp bearing upper right hand corner lowermost, so that, the initially upper edge 40 of each envelope serves as a rough or coarse guide for orienting the guide elements 20 and 21 and manually marked grid 11 to enable the use of the guide elements for fine or vernier adjustments of the manually marked grid for reading of the code thereon. Thus, prior to placing the stack of envelopes in an inclined hopper 42 with their edges 43 abutting a stop plate 44 the envelopes 12 are oriented as described suitable apparatus for orienting the article is disclosed in the alcove mentioned Eckert et. al. patent 2,988,984, it being understood that this may be done manually or by other suitable apparatus for orientating postal article for postage cancellation.

A feed roller mechanism 46, at the bottom of the hopper 42, is used to remove envelopes 12, one at a time and in relatively uniformly spaced relation, for deposit on a horizontally canted conveyor 48, which, in the embodiment shown, is an endless conveyor belt trained over drive

rollers 49 and 50 proximate the input and output ends respectively; a canted vertical conveyor 45 serves as a guide and support for the envelopes 12, it being understood that other conventional article conveying systems may be used. Roller 46 may be a continuously rotating friction element which is cammed at timed intervals into feeding engagement with the bottom envelope in hopper 42, or may be a suction feed roller or the like. Since the envelopes may vary in size the hopper 42 is open-sided and the thickness or opening at the lower end thereof, is controlled by, for example, a spring biased plate, not shown, so that as the roller engages an envelope 12 (or suction is applied), it is drawn through the opening and enlarges same against the spring.

Preferably a pair of scanning or reading stations 60 and 70 are utilized, the first station 60 serving primarily as a reading station for detecting the existence and precise location and relative orientation of grid guide elements 20 and 21 (or the grid itself if it is serving as the guide elements) to produce signals controlling the position and orientation of a grid code reader 74 at station 70. The envelope orientation station could be used to detect the time of passage of articles, the absence of or grossly misoriented grid guide elements 20 and 21, or even missing stamps or conflicting stamps, and may produce a reject signal on a line 62 to reject control circuitry 63 which, in turn, supplies a driving signal to a reject mechanism 64.

Reject mechanism 64, in the embodiment shown, is a vacuum cup or chamber 67 which on receipt of a reject signal from the reject control circuitry 63, removes the article from conveyor 48 and deposits same in a hopper 68. Its operating mechanism includes an arm 66, having a vacuum cup 67 connected to a controlled vacuum source (not shown), which cup is quickly reciprocated, first into engagement with the article, then arm 66 is rotated upwardly and reciprocated outwardly to where the vacuum cup 67 is over the reject hopper 68, the vacuum being released to thus deposit the rejected envelope 12 in the hopper 68. However, for purpose of speed, the arm 66 may simply "kick" the envelope off the conveyor or, the reject signal may be stored in a memory and used subsequently to cause the sorter controls to operate and place the article in a special receptacle.

As noted above, the principal objective of the reading station 60 is to detect the existence, location, and orientation of guide elements 20 and 21 and produce positioning servo signals for the grid code reading station 70. For this purpose it includes two units of detecting elements 71

and 72. Detecting elements 71 and 72 may detect magnetic, electrostatic, fluorescent or conductive elements, depending on whether grid guide elements 20 and 21 are magnetic, electrostatic, fluorescent or conductive. It is again emphasized that the characteristic of the guide elements 20 and 21 which is to serve as the detection mechanism for these elements is significantly different, as a physical phenomenon, from the manually made optically visible code markings 18, 18' which for purpose of reference are made by a pencil, ball point pen, manual impression stamp, adhesive dots, or can be punched holes provided there is a contrasting background color on the envelope 12. Thus, the grid guide elements 20 and 21 can be optically invisible or optically visible as long as the material nature thereof is significantly different from that of a manually marked code. It will be apparent that if the grid squares 11' are small and numerous enough (Fig. 2 A.), the digits of the code may be written through the squares becoming code marks 18' in the squares 11' and read at 70 by a similarly referenced and oriented reading apparatus 74. Moreover grid guide code element 20 may be magnetic and grid guide code element 21 be fluorescent and non-magnetic. In this case the upper detection unit 72 would project a fluorescent responsive beam which would activate element 20 and detect the response and the lower detector unit 71 would detect magnetization of grid guide element 21. It will be apparent that various other arrangements may be used, the responses being combined and analyzed in a reader position control unit 80 in the manner described more fully hereinafter.

Reading station 70 includes an optical head 74 having a bank of photocells arranged in the pattern of template or code grid 11 so as to read code markings 18 (Fig. 2). Optical head 74 is mounted on a carrier 75 to be adjustably positioned linearly along a rack-support 76, as indicated by the arrows. Optical head 74 is also rotatably adjustable in carrier 75, as indicated by the curved arrows 77. The linear and rotating adjustments of optical head 74 are carried out by a servo element 78, it being apparent that a separate servo element may be carried in carrier 75, and coupled to optical head 74 to effect rotary adjustment of same. Signals for driving the servos are obtained from the reader positioning control circuit 80 in the manner described hereinafter. In the event that after the fine or vernier positioning of the optical head 74 the code is unreadable, e.g. there are inadequate signals developed by head 74, a signal may be produced by apparatus, not shown, to cause a sorter

control circuit 90 to effect delivery of the article to a further reject bin or storage receptacle for further processing.

In its preferred form head 74 may comprise a bank of photocells (or an optical character reader), one for each manually markable code position and which are simultaneously activated by an electronic shutter. Moreover, once the code is "read" it may, if desired, be mechanically printed on the article so as to facilitate the next sorting of the same article. It may be reading and code reading stations with the desirable to provide a second set of guide output of the first being stored and compared against the output of the second.

Once the manually marked code has been read by optical head 74 the information is decoded in sorter control 90 which operates to adjust the position of a receiving bin or hopper 95 relative to the output end of conveyor 48 in a conventional manner. Multiple hopper 95 is simply diagrammatic as it is apparent that various forms of deflector gates (See United States patents 3,246,751; 2,988,984; 2,950,005), for this type of selective delivery apparatus may be used in this invention.

While the invention has its greatest utility in interfacing the human or manually marked code elements to automated sorting operations, aspects of the invention may be applicable to machine marked codes where the vagaries of manual marking are eliminated or greatly reduced. In Fig. 4 there is illustrated a manually operated machine for mechanically marking a zip code in a blank space as illustrated in Fig. 3. In this case, the machine 100 has a series of levers 101, 102 . . . 105 each of which positions a code marking element (not shown) according the position of the levers, much in the same manner as a postage meter, and printed by activation of an operating lever 106.

Referring now to Fig. 6 (a) through (e), the reading station 60 is shown as having magnetic reading heads M1, M2 . . . M8 (corresponding to sensor 72 of Fig. 5) and electrical brush elements C1, C2 . . . C12 (corresponding to sensor 71 of Fig. 5). Regarding these brushes, the first to contact a conductive element 21 serves as an electrical supply for the remainder. In these diagrammatic representations postal articles have guide elements 20 and 21 in various locations and angular orientations. In Fig. 6(a) the guide elements 20 and 21 are approximately at the standard or desired position, in (b) slightly low, (c) slightly high, (d) tilted approximately 45° to the left, and (e) tilted approximately 45° to the right. If for any reason the sensors fail to detect the phenomena they are designed to detect at a selected time

interval a signal is produced to reject same. In Fig. 7, the lines labeled M1 . . . M6 correspond to the magnetic read heads M1 . . . M6 respectively and the lines labeled C1 . . . C12 correspond to the brush elements C1 . . . C12. With the guide elements 20 and 21 having the orientations illustrated in Fig. 6(a) to Fig. 6(e) in 7 (a), there are no pulses on lines M5 and M6 and C1 to C8 and since there is no time differential between the center positions of these pulses it is known that the elements were vertical and at the position denoted by which of the sensors produced signal pulses. Thus in Figs. 7 (b) and 7 (c) only the relative height position has changed. By knowing which sensor produced an output signal pulse the location of the guide elements is known. In Figs. 6 (d) and (e) the guide elements are inclined 45°. In Fig. 6 (e) the element 20 is in advance of elongated element 21 so that signals in magnetic heads M1 . . . M8 will be in advance (see Fig. 7 (e)) of signals from brush sensors C1 . . . C12 whereas in Fig. 6(d) the opposite condition prevails. Hence by knowing the times of occurrences of the signal pulses from the two sets of sensors any ambiguity is easily resolved. Moreover, it will be noted that the lengths of the pulses from the brushes in Figs. 7 (d) and (e) are of different lengths and by comparing such pulses in read position control 80 with the standard thereof the degree of angularity may be easily determined so that accurate positioning signals may be supplied by control 80 to reading station 70 for positioning head 74.

Attention is drawn to my copending Application No. 54066/71 (Serial No. 1,380,589) which is directed to a method of sorting articles, each of which carries a code receiving member having thereon locating indicia means and separate manually mechanically marked visible code indicia, said locating indicia means being detectably different in terms of a physical characteristic from the visible code indicia, the method comprising conveying each article along a scanning path, detecting at an upstream region of said path the lateral position and angular orientation of the locating indicia means and producing a control signal when the lateral position and/or angular orientation of the locating indicia means vary from a standard position and angular orientation, adjusting the relative positions and angular orientations of an optical scanning means and the locating indicia means in accordance with said control signal to bring the locating indicia means into the standard position and angular orientation with respect to the optical scanning means, optically scanning the visible code indicia with the optical

scanning means as the article is conveyed along a downstream region of said path, and directing the article to a destination in accordance with the information carried in said visible code.

Application No. 54066/71 (Serial No. 1,380,589) also claims an apparatus for sorting articles each article having, on at least one surface thereof, a code receiving member having a code marked thereon, and at least one guide element of a known geometrical configuration, said code including manually or mechanically marked visible code indicia, the apparatus comprising means for conveying each article along a path with said code receiving member within a general area, first reading means for reading said at least one guide element and producing a signal corresponding to the lateral location and angular orientation of said at least one guide element, second reading means, a code reading head at said second reading means adjusting means for adjusting said code reading head laterally and angularly in accordance with signals from said first reading means, controlling means for receiving signals from said code reading head, and means controlled by said controlling means for directing said article to a location established by signals received from said code reading head.

WHAT I CLAIM IS:—

1. A postage stamp comprising a laminar body member having an adhesive coating on one surface thereof, a blank space or a grid pattern on the other surface of said laminar body member adapted to receive a manually or mechanically placed

pattern of visible code markings, and machine readable locating means spaced inwardly from the periphery of said other surface for causing a response for orientating said manually placed pattern relative to a reading station, said locating means having a physical property different from the property of normal visibility so that said locating means may be read by a machine which will ignore solely visible markings.

2. A postage stamp as claimed in claim 1 wherein said locating means comprises at least a pair of guide elements, one of which has an elongated geometrical shape.

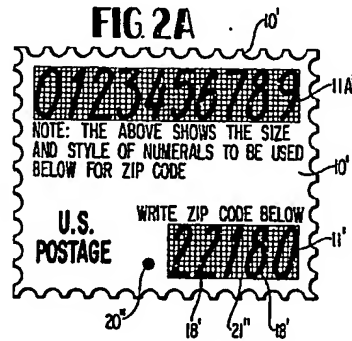
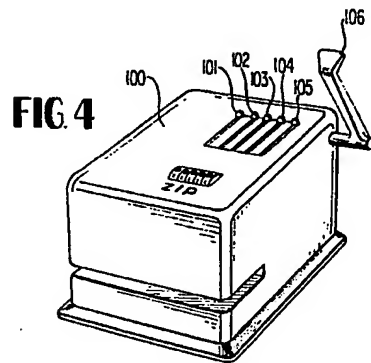
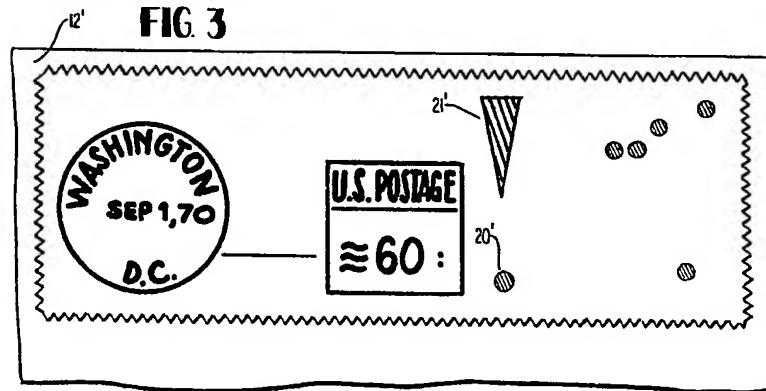
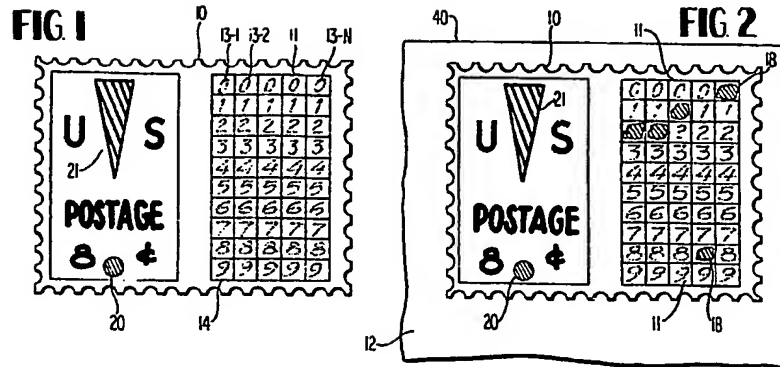
3. A postage stamp as claimed in claim 2 wherein one of said pair of guide elements is of distinctly different responsive character from the other whereby the two guide elements may be sensed by different sensing means responsive to the respective characters.

4. A postage stamp as claimed in claim 3 wherein one of said guide elements is magnetic and the other is electrically conductive.

5. A postage stamp as claimed in any preceding claim having said visible code markings marked thereon, said markings representing the digits of a postal code.

6. Postage stamps substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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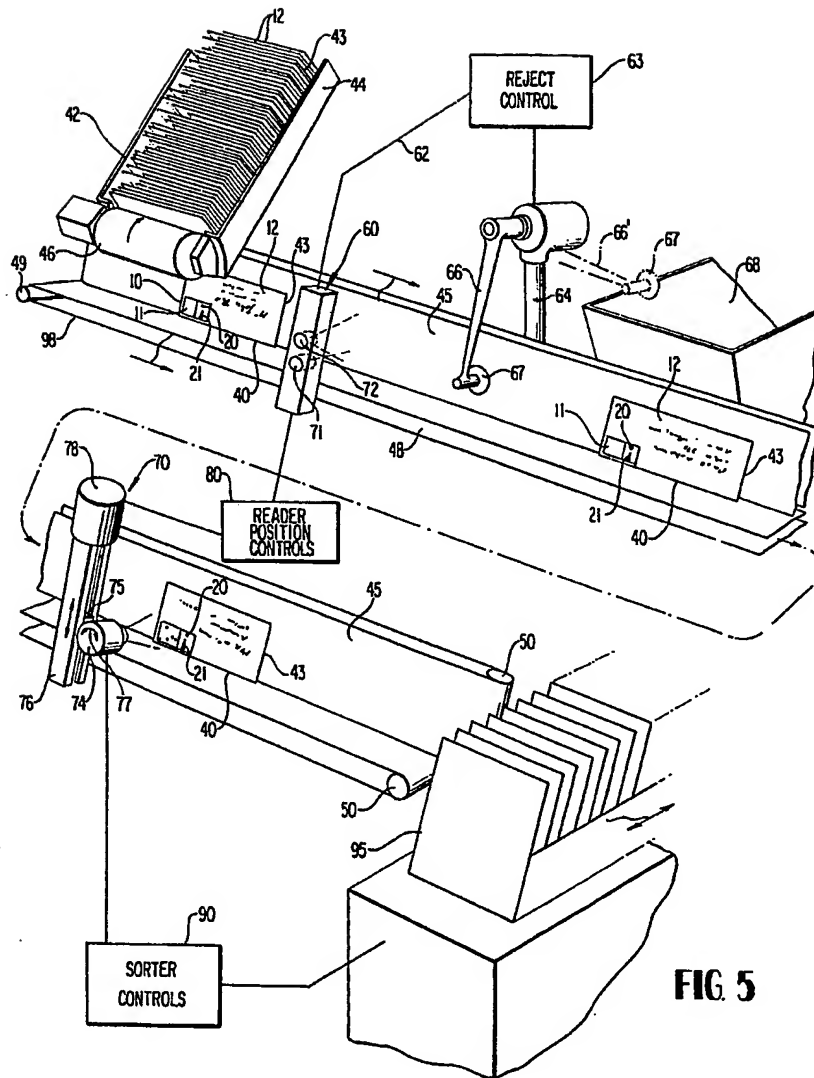
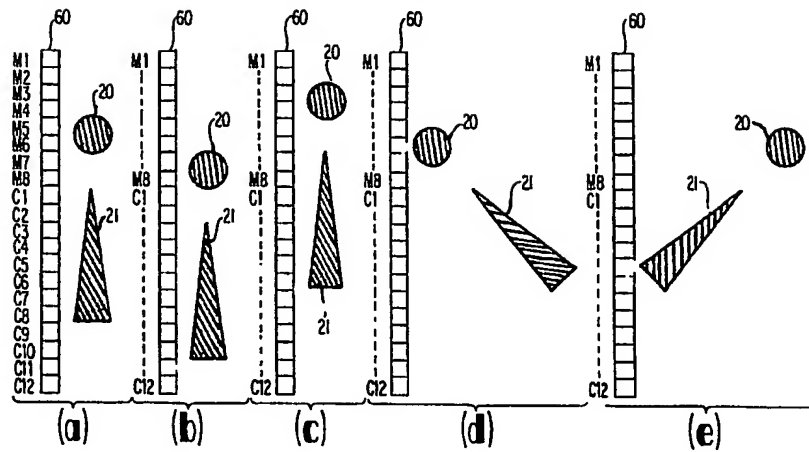


FIG 5

FIG. 6**FIG. 7**